1999–2000 CATS ASSESSMENT
Open-Response Item Scoring Worksheet

Grade 7 – Reading
Type of Passage: Informational

The **academic expectation** addressed by the open-response item "Coming Unglued" is

1.2 Students make sense of the variety of materials they read.

The **core content** addressed by this item includes:

RD-M-2.0.14 Summarize information from a passage.

RD-M-2.0.13 Identify supporting details in a passage.

RD-M-X.0.10 Connect information from a passage to students' lives and/or real world issues.

Coming Unglued

This article explains three stages that occur when two glued objects are pulled apart.

a. Describe what happens at each of the three stages, in the order that they occur.

b. Explain why the theory of how glue works is called the "Rice Krispies" principle.

Use information from the article to support your answers.

SCORING GUIDE
Grade 7 Reading

Score	Description
4	Student clearly describes each of the three stages in order using information from the article. Student explains that the three stages are similar to the noise associated with the cereal.
3	Student describes two or three steps in order using information from the article. Student explains that the two or three stages are similar to the noise associated with the cereal.
2	Student offers limited description using information from the article. Student identifies two or three stages that are similar to the noise associated with the cereal. **OR** Student answers either part A or B.
1	Student shows a minimal understanding of the article.
0	Response is totally incorrect or irrelevant.
Blank	No response.

Order:

1. Popping stage
2. Crackling stage
3. Snapping stage

<u>Examples</u>

Process:

- stretches and then holes appear
- holes increase in size and number in jerky steps, leaving a mass of thin strands
- the strands get thinner and then break

Why the theory is called the “Rice Krispies” principle:

- It is the reverse order of the cereal.

This article describes a study of how glue works. Read the article. Then answer the questions that follow.

Coming unglued

By David L. Chandler
GLOBE STAFF

This may come as no surprise to anyone who has struggled to peel a price sticker off a gift without leaving a big mess: Experiments show that glue can hold things together with a force up to 100,000 times stronger than theory says it should.

Now, say two physicists at Johns Hopkins University, the secret behind this sticky mystery has been pried loose.

They call it the "Rice Krispies" principle. When you try to pull two glued pieces apart, first the glue pops, then it crackles and finally it snaps. (Actually, that's the reverse of the way the cereal's advertising has it.)

Prying apart two blocks of wood with a dab of Elmer's between them may seem simple, but what is going on between the wood molecules and the glue molecules turns out to be an amazingly complicated process – so complicated that even the most powerful supercomputers had not been able to figure out why glue is so tenacious.

But now, after 300 hours of detailed simulations on a Cray C-90 – by some measures, the fastest computer in the world – a very simple version of the problem has finally been cracked. The solution was published in the journal Science by physics professor Mark Robbins and postdoctoral fellow Arlette Baljon.

"The simulations have only begun to be possible," Robbins said in an interview, and they could eventually help engineers develop better adhesives.

Jacob Israelachvili, a chemical engineer at the University of California at Santa Barbara, said the pair's work represents a whole new approach to understanding how glue works.

Robbins, whose analogies tend strongly toward food, explained what happens when something comes unglued.

First there is the popping stage. That's something like what happens when you pull apart two pieces of toast with a layer of honey between them: The honey at first stretches out uniformly, then suddenly holes begin to appear in it.

In the second, "crackling" stage, the holes increase in size and number, in a series of jerky steps – until all that's left is a network of thin strands.

Each strand is made up of glue molecules that are tangled and coiled together like a plate full of spaghetti, so that pulling on one piece tends to pull along a whole mass of strands. Eventually, as they get pulled thinner, each strand breaks – the "snap"– to complete the separation process.

Theorists trying to understand the dynamics of glue had considered only the forces needed to separate one layer of molecules from another, Robbins says, but the real process is much more complex. It's not just one layer of glue molecules being pulled apart, but rather hundreds of layers are being stretched, each subject to the same forces – until one of them finally gives in, and the pieces fly apart.

In short, as singer/songwriter Neil Sedaka put it, breaking up is hard to do.

ANNOTATED STUDENT RESPONSE
Grade 7 Reading

Sample 4-Point Response of Student Work

Student Response

Glue breaks apart in three major stages. The first such stage has been dubbed the "popping" stage. The glue stretches out uniformly-all the same way. But then, small holes appear. Each layer of the glue is being stretched out. They are all under the equal amount of force.

The next major stage is referred to as the "crackling" stage. In the "popping" stage, it was noted that holes begin to appear. In this second stage, the "crackling" occurs because the holes extend and expand. All that is now left is a web of strands-all very small and thin. Each strand is in some way connected to all the others.

The last stage, the "snap" stage, is the final separation. The glue molecules are twisted and tangled together, so, since each strand is connected to all the others, if one breaks, the rest will, too. And that is exactly what happens. Now the glue is separated.

They call this the "Rice Krispies" principle because the noise that the cereal makes when milk is poured on it and the noise the glue makes in separating are similar. But the cause is different.

In glue, it is the sound of dividing. In Rice Krispies, it is the sound of gases being released through small holes in the cereal.

Glue is a very helpful invention, but it's hard to get "unglued"!

← Student clearly describes what happens at the first stage (the "popping" stage), using information from the article.

← Student clearly describes what happens at the second stage (the "crackling" stage), using information from the article.

← Student clearly describes what happens at the third and last stage (the "snapping" stage), using information from the article.

← Student clearly explains why the theory of how glue works is called the "Rice Krispies" principle.

Overall, the student demonstrates a strong ability to summarize information from an informational article, to identify supporting details in the article, and to connect information from the article to real life. After reading an article that describes what happens when two glued objects are pulled apart, the student clearly describes what happens at each of the three stages, in the order that they occur, and clearly explains why the theory of how glue works is called the "Rice Krispies" principle.

ANNOTATED STUDENT RESPONSE
Grade 7 Reading

Sample 4-Point Response of Student Work

Student Response

The 3 stages are the popping, crackling, and then the snapping. During the popping stage, you come across a difficult task-it's like trying to pull apart 2 pieces of toast w/ unbearably sticky honey coming between them. Usually this would be all right, but not when you want to separate them! The honey is the glue in this metaphor and the toast is the 2 objects you're trying to unstick. When you pull the 2 forces apart, the honey (glue) starts to stretch out, and the farther you stretch, the more holes start to appear in your honey (glue). It gets the name "popping" because you can hear a popping sound as your honey (glue) starts to separate. Next comes the crackling stage. As the force is continuously applied, the holes increase in number and size-in many jerky steps. Now all you have left is a network of thin strands. These strands are made up of glue molecules that are all coiled and tangled together, just like spaghetti. Pulling just one strand tends to pull along a whole mess of strands. Finally, you come across your last step-the snapping stage. As these strands get thinner and thinner, each strand breaks, and "snaps" off, making a loud noise. Finally all your glue is separated, and the 3 step process is complete.

Now, the theory of glue is none like any other. Glue can hold together, with just a small drop, up to 100,000 times stronger than ever believed. Finally, after years of studying, Mark Robbins has come up w/ a theory called the "Rice Krispies" principle. Like the cereal, except in a reverse order, separating the glue causes it to pop, crackle, and snap apart. Because glue is so strong, this 3 step process is needed just to help pry the glue apart! They gave it the name "The Rice Krispies" principle probably because it's so easy to remember, because everyone knows that the famous cereal pops, crackles, and snaps! Just like glue!

Student clearly describes what happens at the first stage (the "popping" stage), using information from the article.

Student clearly describes what happens at the second stage (the "crackling" stage), using information from the article.

Student clearly describes what happens at the third and last stage (the "snapping" stage), using information from the article.

Student clearly explains why the theory of how glue works is called the "Rice Krispies" principle.

Overall, the student demonstrates a strong ability to summarize information from an informational article, to identify supporting details in the article, and to connect information from the article to real life. After reading an article that describes what happens when two glued objects are pulled apart, the student clearly describes what happens at each of the three stages, in the order that they occur, and clearly explains why the theory of how glue works is called the "Rice Krispies" principle.

ANNOTATED STUDENT RESPONSE
Grade 7 Reading

Sample 3-Point Response of Student Work

Student Response

The process in which happends in the "Rice Krispies" principal are named as the following.

First during the popping stage the glue will stretch out uniformly. Then suddenly holes begin to form in it. This happends because it popping was the first stage that had been forced so the glue was still going to hold.

Secondly was the crackling stage. During this stage the wholes increased in size and Number. In a series of jerky steps until all of the glue is made up of small strands. This happends because the glue doesn't want to give up. It is going to hold until something strong enough pulls apart.

The last stage which is snapping is when the strands are pulled so thin that they can't hold on anymore and they finally snap.

This is called the "Rice Krispy" principal because it has the 3 sounds of Rice Krispies. Pop, Crackle, & Snap.

← Student generally describes what happens at the first stage (the "popping" stage), using some supporting information from the article.

← Student generally describes what happens at the second stage (the "crackling" stage), using some supporting information from the article.

← Student generally describes what happens at the third and last stage (the "snapping" stage), using some supporting information from the article.

← Student explains why the theory of how glue works is called the "Rice Krispies" principle.

Overall, the student demonstrates a general ability to summarize information from an informational article, to identify supporting details in the article, and to connect information from the article to real life. After reading an article that describes what happens when two glued objects are pulled apart, the student generally describes what happens at each of the three stages, in the order that they occur, and explains why the theory of how glue works is called the "Rice Krispies" principle.

ANNOTATED STUDENT RESPONSE
Grade 7 Reading

Sample 2-Point Response of Student Work

Student Response

In the first stage the glue pops this is when its giveing in. Then it crackles Breaking apart the strands of glue, wich are stuck together. the finaly it snaps when it comes all the way apart.

← Student provides a limited description of each of the three stages, in the order that they occur, using some supporting information from the article.

Overall, the student demonstrates some ability to summarize information from an informational article, and to identify supporting details in the article. After reading an article that describes what happens when two glued objects are pulled apart, the student provides a limited description of what happens at each of the three stages, in the order that they occur, using some supporting information from the article.

ANNOTATED STUDENT RESPONSE
Grade 7 Reading

Sample 1-Point Response of Student Work

Student Response

It is Called the Rice crispy Principle because it makes a Noise's as you pull something that has been glued togather.

← Student attempts to explain why the theory of how glue works is called the "Rice Krispies" principle, but the explanation is not clear.

Overall, the student demonstrates a minimal ability to summarize information from an informational article, to identify supporting details in the article, and to connect information from the article to real life. After reading an article that describes what happens when two glued objects are pulled apart, the student provides a minimal explanation of why the theory of how glue works is called the "Rice Krispies" principle.

INSTRUCTIONAL STRATEGIES
Grade 7 Reading

The open-response item "**Coming Unglued**" was designed to address students' ability to (1) summarize information from a passage, (2) apply knowledge of organizational patterns to help understand a passage, and (3) connect information from a passage to their own lives and/or real world issues. The instructional strategies below present ideas for helping students explore and master these skills.

In order to summarize information from a passage, students could

- Silently read a section of the piece and then retell that section to a partner who would in turn read and retell the next section of the piece.
- Highlight the most important points of the piece.
- Create a graphic organizer for the main point and supporting details of the piece.

In order to apply knowledge of organizational patterns to help understand a passage, students could

- Take notes from a piece, determining the main points, supporting details, and examples of proof.
- Complete graphic organizers to determine which organizational pattern (e.g., cause and effect, comparison, contrast, sequence) is utilized in the piece.
- Evaluate the effect of the organizational pattern based on the topic and purpose of the text.

In order to connect information from this passage to their own lives and/or real world issues, students could

- Experiment by gluing together two pieces of the same substance (e.g., wood, paper) and then pulling those items apart. After completing the experiment, students could write a description of what happened to the glue as the pieces were being separated.
- Brainstorm reasons why the information in the passage is useful and ways in which the knowledge will affect the reader.
- Use their own background knowledge of the topic to predict information that will be presented within the passage.